

# The Bibionidae of New Zealand (Diptera)

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THE FAMILY BIBIONIDAE is poorly represented in the New Zealand fauna; only two genera have been recorded to date. These are represented by six species of *Philia* and one species of *Bibio*. The *Bibio* is an Australian species, but the *Philia* species are endemic and known only from New Zealand. It is interesting to note that two of the New Zealand species represent very nearly the minimum and maximum ranges in size for the *Philia* of the world. Specimens of *P. tuthilli* n. sp. range down to about 2.2 mm. in length. I know of only one species in the entire genus which is possibly smaller than this—*P. gratiosa* (Bigot) of India is reputed to be 2.0 mm. in length. Specimens of *P. nigrostigma* (Walker) measure up to 10.0 mm. in length. The only other species which I know that is this large is *P. gigantea* (Macquart) from the Neotropical Region.

This study is based largely upon material which was collected by Dr. L. D. Tuthill of the University of Hawaii and Mr. R. A. Harrison, Entomologist, Department of Scientific and Industrial Research, Auckland, New Zealand. I am indebted to these workers for the privilege of studying this interesting material.

## *Bibio imitator* Walker

*Bibio imitator* Walker, 1834, Ent. Mag. 2: 470.

*B. substitutis* Walker, 1848, List. Dipt. Brit. Mus. 1: 121 (? synonym).

*B. fulvipennis* Macquart, 1850, Dipt. Exot. Suppl. 4: 17.

*B. ruficoxis* Macquart, 1850, Dipt. Exot. Suppl. 4: 17.

*B. elegans* Jaenicke, 1867, Abhandl. Senckenb. Ges. 6: 317.

*B. helioscops* Schiner, 1868, Reise Novara, Dipt. 2: 20.

This is the only species of *Bibio* which has been recorded from New Zealand. It is distinguished from other Pacific *Bibio* by the all-black coloring, brown fumose wings, and dense yellow pile on the body of the males and by the all-rufous head, thorax, and abdomen, and the dark reddish-brown to black legs (excluding the coxae) of the females.

LENGTH: Body, 6.5–7.5 mm.; wings, 6.5–8.0 mm.

TYPE LOCALITY: "New Holland."

Type in the British Museum (Natural History). The species occurs in Australia, Tasmania, and New Zealand. I have not seen it from the latter country but have seen a large series of specimens from many localities in Australia.

Key to *Philia* known from New Zealand

1. Wing venation normal, no incomplete veins and crossveins . . . . . 2  
Venation incomplete, the m crossvein and the bases of veins  $M_{1+2}$  and  $M_1$  are lacking; very tiny species, body 2.2–2.63 mm. . . . .  
 . . . . . *tuthilli* n. sp.
  2. Front tibiae each with 3 spines, arranged on a strong prominence at the upper third of the segment, and a single spine situated at the apical two thirds of the tibia (Fig. 5a). Wings brownish fumose. Large species, body 6.5–10.0 mm. in length . . . . .  
 . . . . . *nigrostigma* (Walker)
- Spines on front tibiae not arranged as

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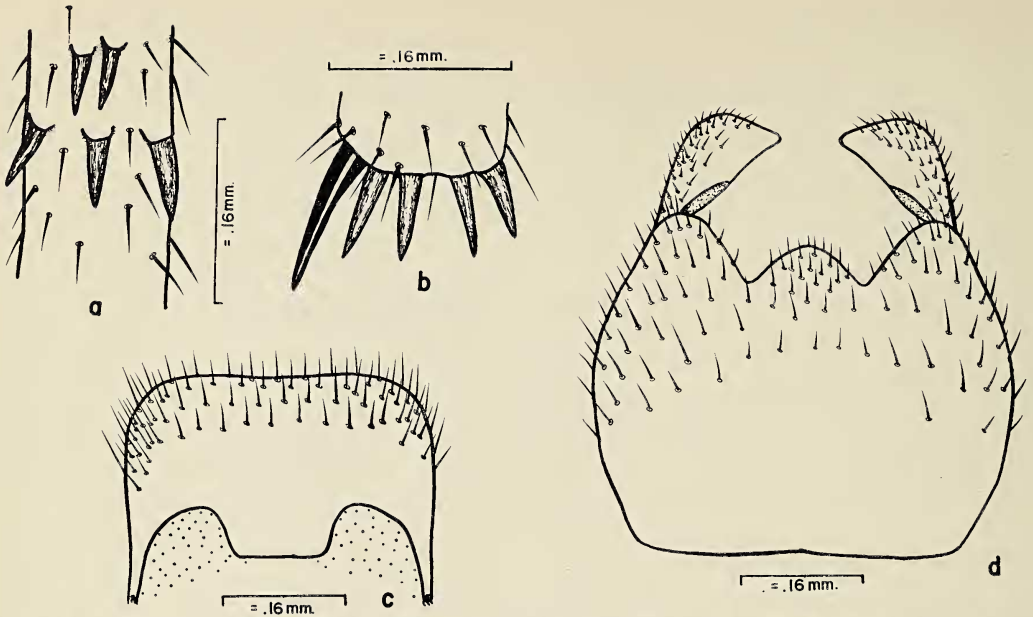


FIG. 1. *P. crinata* Hardy. *a*, Front tibia, median portion; *b*, apical portion of front tibia (lateral aspect); *c*, ninth tergum of male; *d*, male genitalia (ventral aspect).

- above. Wings hyaline or but faintly yellowish fumose. Smaller species, body length under 6.0 mm. . . . . 3
3. Only 3 spines on each front tibia, above the apical set (Fig. 2*a*) . . . *barrisoni* n. sp. Five spines present on front tibia, above the apical set; these are arranged in two groups (Fig. 1*a*) . . . . . 4
4. The two sets of spines located rather close together near the middle of the tibia (Fig. 1*a*). Apical spurs on the front tibiae much stronger than the spines (Fig. 4*a*). Hind metatarsi of males not broader than apices of tibiae . . . . . 5
5. The two sets rather widely spaced, the first is at the basal third of the tibia and the second is near the apical two thirds (Fig. 6*b*). The apical spur about equal in size to the spines (Fig. 6*a*). The hind metatarsi of the males broader than the apices of the tibiae . . . . . *segnis* (Hutton)
5. Pile of body very dense and long, the hairs on the scutellum and in the dorsocentral areas of the mesonotum are about equal to one half the length of the halteres.

Wings slightly yellow fumose, posterior veins brownish. Radial vein setulose throughout its length. Tibiae of male yellowish colored, lighter than the femora. The spur at the apex of each front tibia about 1.5 times as long as the apical spines (Fig. 1*b*) . . . . . *crinata* Hardy

Pile rather sparse and short, scarcely extending higher than the spines of the anterior row on the dorsum of the thorax. Wings hyaline, posterior veins colorless. Radial vein nearly bare. Legs of male entirely dark reddish brown to black. The spur on the front tibia twice as long as the apical spines (Fig. 4*a*) *insolita* (Hutton)

***Philia crinata* Hardy**

Fig. 1*a-d*

*Philia crinata* Hardy, 1951, Hawaii. Ent. Soc., Proc. 14: 262.

This species is related to *P. insolita* (Hutton) but is distinguished by the characters given in the above key and by genital characters (cf. Figs. 1*c*, 1*d*, 4*b*, and 4*c*). The species has

been adequately described except for the genital characters. The antennal segments are more distinctly separated in the specimens at hand than they were in the type series, and the antennae appear to possess 13 segments.

**MALE GENITALIA:** The ninth sternum is rounded on the sides and is slightly broader than long. The cleft on the hind margin extends about 0.25 the length of the segment and a tumescence is present in the middle of the hind margin. The claspers are rather bluntly pointed on their inner apices (Fig. 1*d*). The ninth tergum is about 1.3 times broader than long, its hind margin is straight, and its posterior margin has a flat-topped projection in the median portion (Fig. 1*c*).

**LENGTH:** Body and wings, 4.5–5.5 mm.

**TYPE LOCALITY:** Mt. Wellington, New Zealand.

Type in the United States National Museum.

I have seen additional specimens of this from the following localities in New Zealand: National Park, 4,000 feet, Nov. 6, 1949 (K. P. Lamb), and Waiouru, Oct. 19, 1943, labeled "X galls? on *Olearia virgata*" (D. Hatch). [These would not have come from the galls; they were probably attracted to the plant for feeding.]

*Philia barrisoni* n. sp.

Fig. 2*a-d*

This species is related to *Philia varipes* (Skuse) from Australia. It is distinguished by the short spurs on the front tibiae (Fig. 2*a*) (equal in size to the apical spines, not twice as long); by the more slender basitarsi of the hind legs (Fig. 2*b*); by the black pilose thorax and abdomen; and by the differences in the male genitalia as shown in Figures 2*c*, *d* and 3*a*, *b*. It is also related to *P. acutidens* (Edwards) but is separated by having only 3 spines in the middle of each front tibia and by the black pilose body.

**MALE:** Entirely polished black except for a slight rufous tinge in the ground color of the

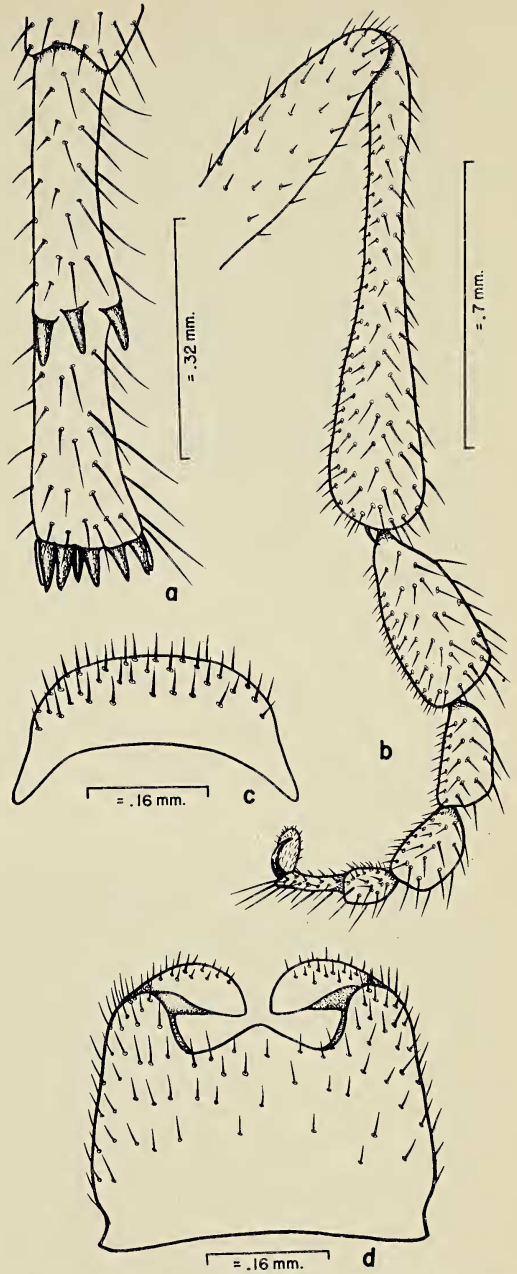


FIG. 2. *P. barrisoni* n. sp. *a*, Front tibia; *b*, hind leg of male; *c*, ninth tergum of male; *d*, male genitalia (ventral aspect).

pleura, humeral ridges, tibiae, and tarsi. All pile is dark brown to black. **Head:** The rostrum is about 0.5 as long as the lower portion of the compound eyes and is not produced beyond the bases of the antennae. The antennae

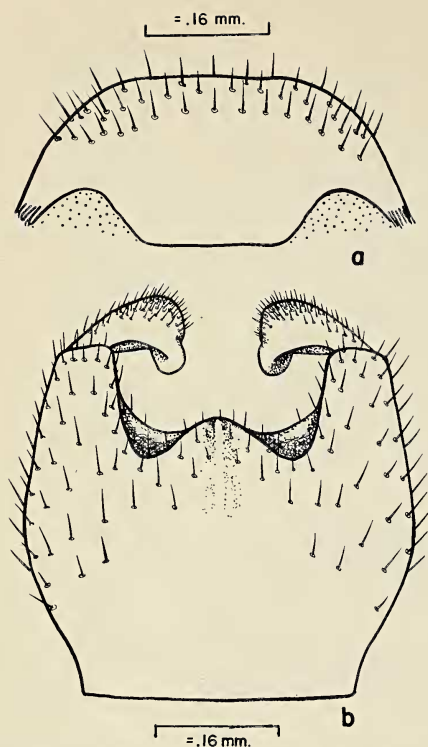


FIG. 3. *P. varipes* (Skuse). *a*, Ninth tergum; *b*, male genitalia (ventral aspect).

are 13 segmented, the apical 4 segments are very closely joined. *Thorax*: With abundant long pile down the dorsocentral areas, around the margins, and on the scutellum. There are 10 teeth in the anterior comb and 12 in the posterior. The stems of the halteres are yellowish, the knobs are dark brown to black. *Legs*: The front tibiae have 3 spines arranged in a transverse row near the middle of the segment. Seven spines are in the apical set and the apical spur is nearly equal in size to the spines (Fig. 2*a*). The hind tibiae are clavate, at their apices they are about equal in width to the widest portion of the femora. The tarsal subsegments are strongly swollen. The basitarsus is not as wide as the apex of the tibia and is about twice as long as wide (Fig. 2*b*). *Wings*: Nearly hyaline, very faintly fumose. The stigma is brown in color and oval in shape. The costa extends to about halfway between the tips of veins *Rs* and *M*<sub>1</sub>. The anterior veins are brown,

and the posteriors are colorless or but slightly yellowed. The venation is typical for the genus. *Abdomen*: About equal in length to the remainder of the body. Compared to *varipes* and related species, the abdomen is rather sparsely pilose. *Genitalia*: The ninth tergum is over twice as broad as long and is straight or very slightly convex on the hind margin (Fig. 2*c*). The ninth sternum is cleft 0.3 to 0.25 of its length on the hind margin and has a tumescence in the middle of this concavity. The claspers are simple and are slightly pointed at their apices (Fig. 2*d*).

LENGTH: Body, 3.6 mm.; wings, 3.8 mm.

FEMALE: Unknown.

Holotype male, Chateau Track, National Park, Feb. 27, 1949 (R. A. Harrison). Eight paratypes, all males: one same data as type; one from Mangatepopo, National Park, Feb. 26, 1949 (R. A. Harrison) and six from "Above Mangatepopo Hut," National Park, Feb. 26, 1949 (R. A. Harrison).

The type and four paratypes have been returned to Mr. Harrison, Department of Scientific and Industrial Research, Auckland, New Zealand. One paratype has been deposited in the British Museum (Natural History), one is at the U. S. National Museum, one in the Bishop Museum, Honolulu, Hawaii, and one is at the University of Hawaii.

### *Philia insolita* (Hutton)

Fig. 4*a-c*

*Dilophus insolitus* Hutton, 1901, New Zealand Inst., Trans. 34: 193.

This species has been adequately described, except for genital characters, in my paper on the Pacific *Philia* (Hardy, 1951, Hawaii. Ent. Soc., Proc. 14: 264-265). It is related to *P. segnis* (Hutton) and *P. crinata* Hardy and is distinguished by the characteristics given in the above key and by the male genitalia as in Figures 4*b, c, 6c, 1d*, and as described below.

MALE GENITALIA: The ninth tergum is about 1.3 times as wide as long, and the hind margin

is straight or nearly so (Fig. 4*b*). The ninth sternum is about as broad as long, and the cleft on the hind margin extends about 0.25 the length of the segment. The claspers are sharp pointed on their inner apices (Fig. 4*c*).

LENGTH: Body and wings, 4.3–5.5 mm.

TYPE LOCALITY: Christchurch.

The type is in the Canterbury Museum, Christchurch.

I have previously recorded this species from several localities in New Zealand.

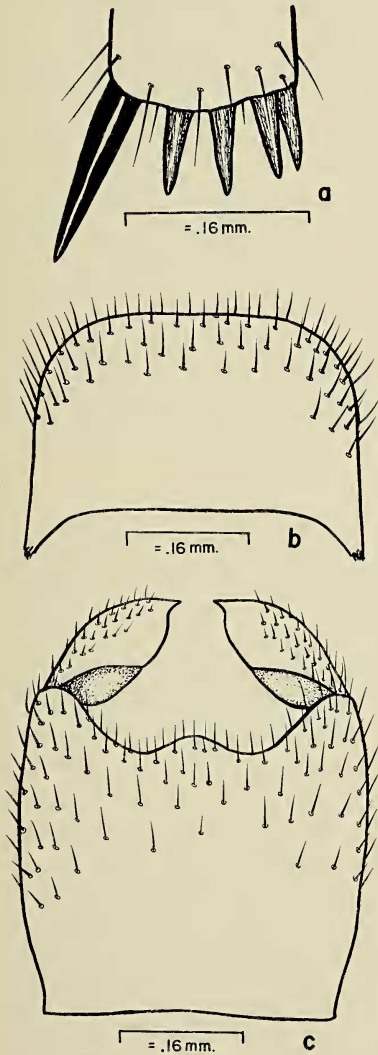


FIG. 4. *P. insolita* (Hutton). *a*, Apex of front tibia (lateral aspect); *b*, ninth tergum of male; *c*, male genitalia (ventral aspect).

### *Philia nigrostigma* (Walker)

Fig. 5*a-c*

*Bibio nigrostigma* Walker, 1848, Cat. Dipt. Brit. Mus., p. 121.

*B. zealandicus* Walker, 1858, Ent. Soc. London, Trans. (n.s.) 4: 235. New synonymy.

*Dilophus spectabilis* Nowicki, 1875, Krakauer K. K. Akad. d. Wissen., Mem. 2: 10.

*Bibio zealandicus* Walker has been previously treated as a variety of *nigrostigma*, distinguished from the typical form by having the abdomen of the female ferruginous below instead of black. The coloration of the females has been found to be so variable that it does not appear practical to recognize this variety. This species has been adequately described, except for the genital characters, in my paper on the Pacific *Philia* (Hardy, 1951, Hawaii. Ent. Soc., Proc. 14: 268–270). It can be readily distinguished from the other New Zealand species by its large size, the brown fumose wings, and the arrangement of the spines on the front tibiae (Fig. 5*a*).

MALE GENITALIA: The ninth tergum is nearly twice as wide as long and is gently concave on its hind margin (Fig. 5*b*). The posterior lateral margins of the ninth sternum are produced into a pair of short lobes which extend about halfway to the apices of the claspers. The claspers are large and conspicuous and are enlarged at their apices and shaped like a hammer head (Fig. 5*c*). The ninth sternum is slightly broader than long.

LENGTH: Body and wings, 6.5–10.0 mm.

TYPE LOCALITY: "New Zealand."

The type is in the British Museum (Natural History).

I have previously recorded this species from several localities in New Zealand. Specimens have since been seen from the following: Southeast of Taupo, 3,000 feet, Dec. 7, 1949 (L. D. Tuthill); Mt. Wellington, Lava Fields, Nov. 12, 1948 (S. A. Rumsey); Owairaka, Nov. 16, 1940 (D. Spiller) and Avondale, Auckland, Dec., 1949 (R. A. Harrison).

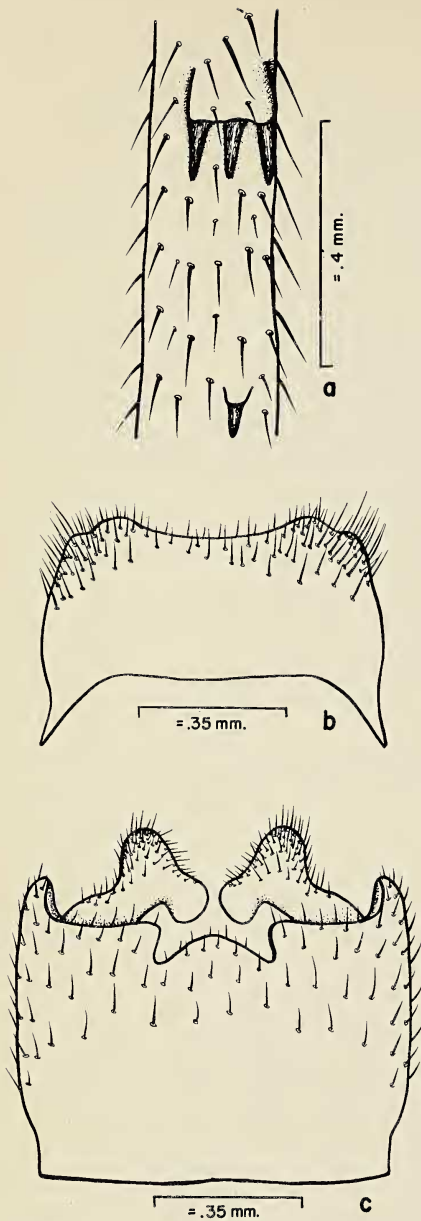


FIG. 5. *P. nigrostigma* (Walker). *a*, Front tibia, median portion; *b*, ninth tergum of male; *c*, male genitalia (ventral aspect).

### *Philia segnis* (Hutton)

Fig. 6a-c

*Dilophus segnis* Hutton, 1901, New Zealand Inst., Trans. 34: 194.

This species is related to *P. insolita* (Hutton) but is distinguished by the arrangement of

the spines on the front tibiae (Fig. 6*b*); by the small, poorly developed apical spurs of the front tibiae (Fig. 6*a*); and by having the hind metatarsi of the males more strongly swollen, broader than the apices of the tibiae. The ninth tergum is twice as wide as long, and the hind margin is very slightly concave (Fig. 6*c*). The ninth sternum and the claspers are shaped as in *P. insolita* (Fig. 4*c*). For further descriptions and figures of this species see Hardy, 1951 (Hawaii. Ent. Soc., Proc. 14: 272-273).

LENGTH: Body, 4.5-5.0 mm.; wings, 4.0-4.2 mm.

TYPE LOCALITY: Christchurch, New Zealand.

The type is in the Canterbury Museum, Christchurch.

I have previously recorded this species from several localities in New Zealand. Two female specimens have recently been seen which appear to be this species; they were from Blenheim, Nov. 15, 1942 (D. Spiller) and Titi-rangi, Auckland, Oct. 2, 1949 (E. Bray).

### *Philia tubilli* n. sp.

Fig. 7a-f

This remarkable species is readily differentiated from any known member of the genus *Philia* by its incomplete wing venation. This is the only species which I have seen from the entire world which lacks the m crossvein (posterior crossvein) and which has the bases of veins  $M_{1+2}$  and  $M_1$  evanescent (Fig. 7*d*). This is also one of the smallest species of *Philia* which has been recorded, and the shape of the head (Fig. 7*a*) is unique for this genus.

MALE: Tiny, chiefly shining black species with a faint, reddish tinge in the ground color of the pleura, humeral ridges, scutellum, and legs. Pile all black. *Head*: The upper portion of each compound eye is brownish red and is densely covered with short pile; the lower part of each eye is black. The front margins of the compound eyes are produced beyond the bases of the antennae and completely ob-



FIG. 6. *P. segnis* (Hutton). *a*, Apex of front tibia (lateral aspect); *b*, front tibia, median portion; *c*, ninth tergum of male.

scure the basal 3 or more segments in most specimens (Fig. 7*a*). The face is not at all produced, its margin is sunken below the eye margins and is not visible from a lateral view. The antennae are apparently about 9 segmented. The flagellum is clavate in shape, and the segments are so closely joined that they cannot be accurately counted. The antennae project downward (Fig. 7*a*) rather than upward as is the usual condition in *Philia*. The labella and palpi are largely hidden beneath the margins of the compound eyes. *Thorax*: With rather long black dorsocentral and marginal hairs. The scutellum has long hairs around its hind margin. The halteres are black

except for a yellowish tinge on their bases. *Legs*: With all segments slender. The front tibiae have two sets of spines, composed of two spines each, above the apical set. The first two spines are close together and are situated at about the basal one third of the segment. The second set has the spines more widely spaced and situated near the apical two thirds of the segment (Fig. 7*b*). The apical spur is small, approximately equal in size to the spines. The segments of the hind tarsi are slender, not at all swollen. *Wings*: Very faintly tinged, almost hyaline. The stigma is light brown and is oblong in shape. The anterior veins are dark brown, the posteriors are hyaline to faintly yellowish. The costa extends about 0.4 the distance between veins  $R_s$  and  $M_1$ . The  $m$  crossvein and the bases of veins  $M_{1+2}$  and  $M_1$  are completely lacking (Fig. 7*d*). Except for the basal portion, the anal vein is represented only by a slight fold in the wing. The shape of cell  $R$  is very different from that of other *Philia*. The  $r-m$  crossvein is more nearly longitudinal in position, and there is no sharp angle at the point of junction of the  $r-m$  and vein  $M_{1+2}$ . Veins  $M_{1+2}$  and  $R_s$  give the appearance of being a single continuous vein (Fig. 7*d*). *Abdomen*:

About twice as long as the thorax and sparsely pilose. *Genitalia*: The ninth tergum is about twice as wide as long. The anterior margin is straight, or nearly so, and the posterior margin is convex (Fig. 7*e*). The sternum is about as wide as long and has a small tumescence in the middle of the hind margin. The concavity on the hind margin extends about 0.25 the length of the segment. The claspers are rather sharply pointed at their apices (Fig. 7*f*).

LENGTH: Body, 2.63 mm.; wings, 2.26 mm.

FEMALE: *Head*: Of usual shape for genus, the sclerotized portion in front of the eyes is about 0.3 as long as the eyes, and the portion behind the eyes is nearly as long as the eyes. The antennae appear to be 10 or 11 segmented. The segments are very closely joined and are difficult to discern as in the male. The ocellar tubercle is not well devel-

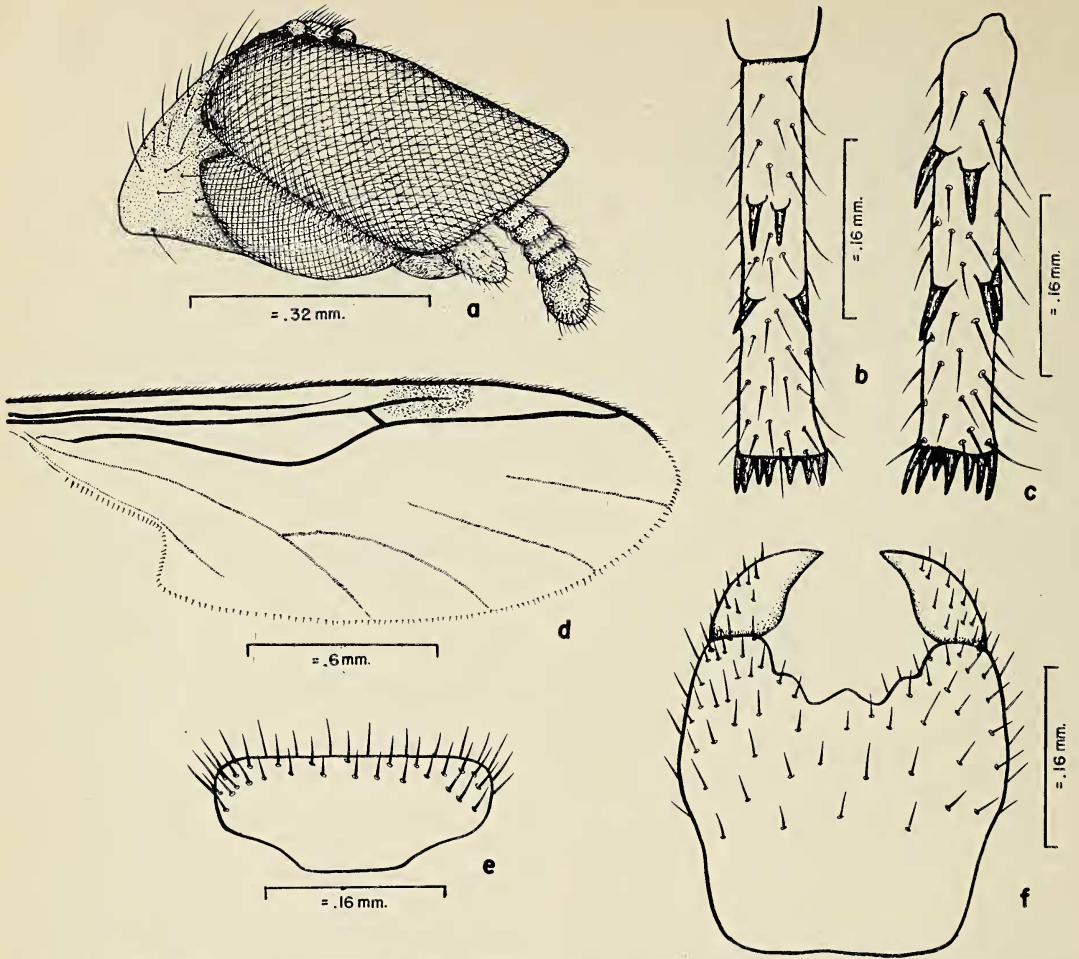


FIG. 7. *P. tubilli* n. sp. *a*, Head of male (lateral aspect); *b*, front tibia of male; *c*, front tibia of female; *d*, wing; *e*, ninth tergum of male; *f*, male genitalia (ventral aspect).

oped and extends only the height of the ocelli above the level of the vertex. The head is entirely polished black and is sparsely brown to black pilose. *Thorax*: Chiefly polished black, tinged with red. The propleura and the area of the dorsum between the combs are rufous tinged with brown. The anterior comb contains 12 blunt teeth, the posterior comb 10 sharp teeth. *Legs*: The front coxae and the bases of all the femora are rufous. The remainder of the legs are brown to black, tinged with red. The spines on the front tibiae are much stronger than in the males and 3 spines are present in the middle set; 2 spines placed one above the other on the outside dorsal

surface and 1 spine placed on the inner dorsal surface (Fig. 7*c*). The extra spine on the females is smaller than the others and it possibly may occur, at least as a rudiment, in the males. I have been unable to detect it on the specimens at hand but the smaller spines of the males are sometimes difficult to differentiate; in small species a tiny spine could easily be obscured by the bristles of the legs. *Wings*: Slightly more fumose than in the males. *Abdomen*: Brown, tinged with red. The abdomen is sparsely covered with short black pile. **LENGTH**: Body, 2.2–2.45 mm.; wings, 2.5–2.65 mm.

**HOLOTYPE** male, allotype female, and twen-



ty paratypes (ten males and ten females): Lake Taupo, New Zealand, Feb. 20–22, 1950 (L. D. Tuthill).

The type, allotype, and a series of paratypes are being deposited in the Cawthron Institute,

Nelson, New Zealand (at Dr. Tuthill's request). The paratypes are in the following collections: U. S. National Museum, British Museum (Natural History), Bishop Museum, Honolulu, and the University of Hawaii.